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- 2 . Plural processors
- 3 .. Master-slave
- 4 .. Parallel
- 5 ... Shared memory
- 6 .. Hybrid types (analog, digital)
- 7 .. Including sequence or logic processor
- 8 . Cascade control
- 9 . Supervisory control
- 10 .. Of analog controllers
- 11 . Sequential or selective
- 12 .. State of condition or parameter (e.g., on/off)
- 13 ... Position responsive
- 14 ... Time responsive (duration)
- 15 Having display
- 16 Clock-calendar (e.g., time of day)
- 17 .. Operator interface (e.g., display with control)
- 18 ... Specific programming (e.g., relay or ladder logic)
- 19 .. Plural controlled systems, mechanisms, or elements
- 20 .. Plural controllers
- 21 .. Failure protection or reliability
- 22 .. Electrical power distribution
- 23 .. Sequence program response
- 24 ... Addressing
- 25 ... I/O table
- 26 ... Diagnostics or debugging
- 27 ... Having status indication
- 28 . Optimization or adaptive control
- 29 .. Having model
- 30 ... Comparison with model (e.g., model reference)
- 31 ... Having adjustment of model (e.g., update)
- 32 .. Specific criteria of system performance
- 33 ... Constraint or limit (e.g., max/min)
- 34 Variable
- 35 Bidirectional (e.g., oscillatory)
- 36 Economic (e.g., cost)
- 37 ... Gain (e.g., tuning)
- 38 .. Having perturbation
- 39 ... Test signal
- 40 .. Plural modes
- 41 ... Proportional-Integral (P-I)
- 42 Proportional-Integral-Derivative (P-I-D)
- 43 ... Proportional-Derivative (P-D)
- 44 .. Feed-forward (e.g., predictive)
- 45 ... Combined with feedback

<u>46</u>	.. Rate control
<u>47</u>	.. Trainable system (e.g., self-learning, self-organizing)
<u>48</u>	... Neural network
<u>49</u>	.. Expert system
<u>50</u>	.. Fuzzy logic
<u>51</u>	.. Statistical process control (SPC)
<u>52</u>	.. Parameter estimation or identification
<u>53</u>	.. Multiple input-multiple output (MIMO) system feature (e.g., decoupling)
<u>54</u>	.. Having particular compensation or stabilization feature
<u>55</u>	... Filtering
<u>56</u>	. Digital positioning (other than machine tool)
<u>57</u>	.. Alignment or registration
<u>58</u>	... Having position marking
<u>59</u>	... Having optical sensing (e.g., image projection)
<u>60</u>	.. Support positioning (e.g., table, stage)
<u>61</u>	.. Multiple axis motion or path control
<u>62</u>	... Orientation (e.g., posture, pose)
<u>63</u>	... Including velocity or acceleration control
<u>64</u>	... Position recording
<u>65</u>	.. Operator control of remotely located element
<u>66</u>	.. Having particular position determining apparatus (e.g., portable or handheld)
<u>67</u>	. Plural variables
<u>68</u>	.. Ratio
<u>69</u>	.. Positional (e.g., velocity, acceleration)
<u>70</u>	... Positional with nonpositional
<u>71</u>	. Specific compensation or stabilization feature
<u>72</u>	.. Lag (e.g., deadtime)
<u>73</u>	. Sampled data system
<u>74</u>	.. Variable rate
<u>75</u>	. Multiple modes (e.g., digital/analog)
<u>76</u>	.. Manual/automatic
<u>77</u>	.. Fine/coarse
<u>78</u>	. Having specific error signal generation (e.g., up/down counter)
<u>79</u>	. Having protection or reliability feature
<u>80</u>	.. Warning or alarm
<u>81</u>	.. Self-test
<u>82</u>	.. Backup/standby
<u>83</u>	. Having operator control interface (e.g., control/display console)
<u>84</u>	.. Keyboard
<u>85</u>	.. Positional (e.g., joystick)
<u>86</u>	. Having preparation of program
<u>87</u>	.. Editing/modifying
<u>88</u>	.. Playback
<u>89</u>	. Having specific algorithm
<u>90</u>	SPECIFIC APPLICATION, APPARATUS OR PROCESS
<u>91</u>	. Contest or contestant analysis, management, or monitoring (e.g., statistical analysis, handicapping, scoring)
<u>92</u>	.. Scoring
<u>93</u>	.. Probability determination or handicapping
<u>94</u>	. Digital audio data processing system
<u>95</u>	. Product assembly or manufacturing
<u>96</u>	.. Integrated system (Computer Integrated Manufacturing (CIM))
<u>97</u>	.. Design or planning
<u>98</u>	... 3-D product design (e.g., solid modeling)
<u>99</u>	... Resource allocation
<u>100</u>	.... Job scheduling
<u>101</u>	..... Priority ordering
<u>102</u>	..... Job release determination

<u>103</u>	... Constraints or rules
<u>104</u>	.... Knowledge based (e.g., expert system)
<u>105</u>	... Rework or engineering change
<u>106</u>	... Material requirement
<u>107</u>	.... Bill of material
<u>108</u>	.. Performance monitoring
<u>109</u>	... Quality control
<u>110</u>	.... Defect analysis or recognition
<u>111</u>	... Worker or work station efficiency
<u>112</u>	.. Having particular work transport control between manufacturing stations
<u>113</u>	... Mobile transport
<u>114</u>	.. Work positioning
<u>115</u>	.. Product tracking (e.g., having product or carrier identification)
<u>116</u>	... Having identification controlled manufacturing operation
<u>117</u>	.. Particular manufactured product or operation
<u>118</u>	... Three-dimensional product forming
<u>119</u>	.... Rapid prototyping (e.g., layer-by-layer, material deposition)
<u>120</u>	..... Stereolithography
<u>121</u>	... Integrated circuit production or semiconductor fabrication
<u>122</u>	... Continuous material having indeterminate length (e.g., web, strand, strip, or sheet)
<u>123</u>	.... Material deposition or application (e.g., spraying, coating)
<u>124</u>	.... Registration control
<u>125</u>	..... Having a reference mark or pattern
<u>126</u>	.... Winding
<u>127</u>	.... Sheet making (e.g., paper product)
<u>128</u>	..... Paper machine or subsystem control
<u>129</u>	..... Profile analyzer or controller
<u>130</u>	... Textile
<u>131</u>	.... Pattern design
<u>132</u>	..... For a garment
<u>133</u>	..... Having particular pattern producing operation (e.g., dyeing)
<u>134</u>	.... Pattern cutting
<u>135</u>	.... Pattern matching or positioning
<u>136</u>	.... Sewing
<u>137</u>	..... Having particular input data (e.g., stitch)
<u>138</u>	..... Embroidering
<u>139</u>	.... Spinning or winding (e.g., yarn)
<u>140</u>	.... Loom control
<u>141</u>	.... Knitting
<u>142</u>	.... Fiber preparation
<u>143</u>	.... Having monitoring or inspecting (e.g., abnormality detection)
<u>144</u>	..... Yarn quality
<u>145</u>	... Metal
<u>146</u>	.... Casting or drawing
<u>147</u>	..... Control of metallurgical property
<u>148</u>	.... Rolling
<u>149</u>	..... Having schedule adjustment
<u>150</u>	..... Control or detection of a particular condition
<u>151</u>	..... Speed control
<u>152</u>	..... Tension control (e.g., interstrand)
<u>153</u>	..... Temperature control
<u>154</u>	..... Flatness or crown control
<u>155</u>	..... Thickness control
<u>156</u>	..... Roll eccentricity compensation
<u>157</u>	... Glassware forming
<u>158</u>	.... IS (individual section) machine
<u>159</u>	... Machining

<u>160</u>	.... Having particular tool or tool operation
<u>161</u>	..... Tracing or duplicating
<u>162</u>	..... Electrical discharge machining (EDM)
<u>163</u>	..... 3-D sculpturing using nontracing prototype sensor
<u>164</u>	..... Grinding
<u>165</u>	..... Bending (e.g., press brake)
<u>166</u>	..... Laser
<u>167</u>	.... Of elongated material (e.g., timber, veneer, web)
<u>168</u>	.... Portable (e.g., handheld)
<u>169</u>	.... Supervisory control (e.g., plural tools or plural processors)
<u>170</u>	.... Having particular control of a motor parameter
<u>171</u>	.... Material usage optimization
<u>172</u>	.... Multiple mode (e.g., rough-finish, coarse-fine)
<u>173</u>	.... Adaptive (optimizing) system
<u>174</u>	.... Performance monitoring
<u>175</u>	..... Condition of tool or workpiece (e.g., tolerance, tool wear)
<u>176</u>	..... Offsetting
<u>177</u>	..... Protective or diagnostic feature
<u>178</u>	..... Tool/workpiece interference prevention
<u>179</u>	.... Tool selection/change
<u>180</u>	.... Having operator interface feature
<u>181</u>	..... Specific programming format (e.g., macro)
<u>182</u>	..... Including CAD, CAM, or CIM technique
<u>183</u>	..... Preset pattern
<u>184</u>	..... Machining path display
<u>185</u>	..... Prompting technique
<u>186</u>	.... Digital positioning technique
<u>187</u>	..... For curve or contour
<u>188</u>	..... Including velocity or acceleration control
<u>189</u>	..... Interpolation
<u>190</u>	..... Specified tool feed path at entry or withdrawal
<u>191</u>	..... Repeated machining passes
<u>192</u>	..... Alignment of tool or workpiece (e.g., origin or path return)
<u>193</u>	..... Positional compensation or modification compensation or mod
<u>194</u>	.... Coordinate transformation technique
<u>195</u>	.... Having particular measuring device (e.g., probe)
<u>196</u>	... Extruding
<u>197</u>	... Molding
<u>198</u>	.... Control of curing
<u>199</u>	..... Vulcanization
<u>200</u>	.... Injection
<u>201</u>	..... Plural molding machines or stations
<u>202</u>	..... Control of temperature
<u>203</u>	..... Control of pressure
<u>204</u>	.... Monitoring, inspection, or control of a particular condition
<u>205</u>	..... Control of temperature
<u>206</u>	... Pressing
<u>207</u>	... Heating
<u>208</u>	.... Drying
<u>209</u>	.... Furnace
<u>210</u>	..... Multizone
<u>211</u>	.... Oven
<u>212</u>	.... Sintering, soldering, or bonding
<u>213</u>	.. Article handling
<u>214</u>	.. Article storing, retrieval, or arrangement (e.g., warehousing, automated library)
<u>215</u>	... Having an identification code
<u>216</u>	... Order filling
<u>217</u>	... Article support load management (e.g., palletizing)

<u>218</u>	... Particular charging or discharging apparatus
<u>219</u>	.. Associating or disassociating plural articles
<u>220</u>	... Inserting
<u>221</u>	.... Having an identification code
<u>222</u>	..... Monitoring or inspection (e.g., incomplete assembly)
<u>223</u>	... Collating or sorting
<u>224</u>	.... Having an identification code
<u>225</u>	.. Having an identification code
<u>226</u>	... Identification code determines article destination
<u>227</u>	.... Preparation of an article for an identification code (e.g., printing, encoding)
<u>228</u>	.. Having particular transport between article handling stations
<u>229</u>	... Transport position identification
<u>230</u>	... Having a conveyor
<u>231</u>	.. Dispensing or vending
<u>232</u>	... Operator or payment initiated
<u>233</u>	.... Customized dispensed article (e.g., operator design)
<u>234</u>	.... Demonstration or duplication of article (e.g., software, video)
<u>235</u>	.... Printing on or of dispensed or vended article
<u>236</u>	.... Data collection or reporting (e.g., sales, inventory)
<u>237</u>	.... Authorization (e.g., password, time usage limit, personal identification number (PIN))
<u>238</u>	.... Price adjustment
<u>239</u>	... Blending or mixing
<u>240</u>	... Condition controlled dispensing (e.g., weight or volume)
<u>241</u>	... Central control of plural dispensing units
<u>242</u>	... Particular supply arrangement (e.g., plural sources or compartments)
<u>243</u>	.... Movable (e.g., rotatable)
<u>244</u>	... Monitoring or inspection
<u>245</u>	.. Robot control
<u>246</u>	.. Combined with knowledge processing (e.g., natural language system)
<u>247</u>	.. Plural controlled devices or plural nonvision controlling devices
<u>248</u>	... Plural robots
<u>249</u>	... Plural processors
<u>250</u>	.. Specific enhancing or modifying technique (e.g., adaptive control)
<u>251</u>	... Coordinate transformation
<u>252</u>	... Interpolation
<u>253</u>	... Programmed data (e.g., path) modified by sensed data
<u>254</u>	... Compensation or calibration
<u>255</u>	... Collision prevention
<u>256</u>	... Overload prevention
<u>257</u>	... Based on user input
<u>258</u>	.. Having particular sensor
<u>259</u>	... Vision sensor (e.g., camera, photocell)
<u>260</u>	.. Having control of force
<u>261</u>	... Having control of robot torque
<u>262</u>	.. Using particular manipulator orientation computation (e.g., vector/matrix calculation)
<u>263</u>	... Using Jacobian computation
<u>264</u>	.. Having particular operator interface (e.g., teaching box, digitizer, tablet, pendant, dummy arm)
<u>265</u>	.. Nonreactive mixing process (e.g., mixing cement, preparing solution, diluting chemical)
<u>266</u>	.. Chemical process control or monitoring system
<u>267</u>	.. Titration or pH level
<u>268</u>	.. Synthesis process
<u>269</u>	... Polymerization/trimerization
<u>270</u>	.. Distillation
<u>271</u>	.. Refinement or purification or rejuvenation

- 272 ... Of fuel
- 273 .. Separation process
- 274 .. Control of combustion or heating apparatus (e.g., kiln, furnace, autoclave, burner, combustion system)
- 275 . Mechanical control system
- 276 .. HVAC control
- 277 ... Multiple zones
- 278 ... Specific thermally responsive controller
- 279 .. Balancing or alignment
- 280 .. Vibration or acoustic noise control
- 281 .. Control of fluid level or volume
- 282 .. Flow control (e.g., valve or pump control)
- 283 ... Dispensing management (e.g., spraying)
- 284 Irrigation
- 285 ... Fluid mixing
- 286 . Electrical power generation or distribution system
- 287 .. Turbine or generator control
- 288 ... Cogenerative system
- 289 ... Adaptive valve control
- 290 For turbine speed control
- 291 .. Energy consumption or demand prediction or estimation
- 292 .. System protection (e.g., circuit interrupter, circuit limiter, voltage suppressor)
- 293 ... Abnormal power, current, or impedance condition
- 294 ... Abnormal phase, waveform, or polarity condition
- 295 .. Power allocation management (e.g., load adding/shedding)
- 296 ... Time based control (e.g., real time or duty cycle)
- 297 .. Power supply regulation operation
- 298 ... By voltage regulation
- 299 . Specific application of temperature responsive control system
- 300 .. For heating or cooling
- 301 . Specific application of pressure responsive control system
- 302 . Specific application of positional responsive control system
- 303 . Specific application of dimensional responsive control system
- 304 . Specific application of speed responsive control system
- 305 . Specific application of weight responsive control system
- 306 . Specific application of control based on elapsed time

CROSS-REFERENCE ART COLLECTIONS

900 **SPECIAL ROBOT STRUCTURAL ELEMENT**

FOREIGN ART COLLECTIONS

FOR000 **CLASS-RELATED FOREIGN DOCUMENTS**

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

- FOR101 **SEQUENTIAL OR SELECTIVE DATA PROCESSING CONTROL SYSTEM, METHOD, OR APPARATUS (364/140)**
- FOR102 **OPTIMIZATION OR ADAPTIVE DATA PROCESSING CONTROL SYSTEM, METHOD, OR APPARATUS (364/148)**
- FOR103 **DIGITAL POSITIONING (OTHER THAN MACHINE TOOL) CONTROL SYSTEM, METHOD, OR APPARATUS (364/167.01)**

FOR104 **GAME OR AMUSEMENT (364/410)**

FOR105 . Scoring (364/411)

FOR106 . Wagering (364/412)

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